

(11) **EP 2 133 359 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
10.03.2010 Bulletin 2010/10

(51) Int Cl:  
*C07K 14/285* (2006.01) *A61K 39/102* (2006.01)  
*C12N 15/70* (2006.01) *C12N 15/09* (2006.01)  
*C12N 15/70* (2006.01) *C12N 15/09* (2006.01)

(43) Date of publication A2:  
16.12.2009 Bulletin 2009/51

(21) Application number: **09170138.3**

(22) Date of filing: **16.03.2000**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**

(30) Priority: **16.03.1999 US 268347**

(62) Document number(s) of the earlier application(s) in  
accordance with Art. 76 EPC:  
**07021386.3 / 1 903 055  
00910463.9 / 1 180 119**

(71) Applicant: **Sanofi Pasteur Limited**  
**Toronto ON M2R 3T4 (CA)**

(72) Inventors:  
• **Loosmore, Sheena**  
**Toronto**  
**Ontario L4G 4R4 (CA)**

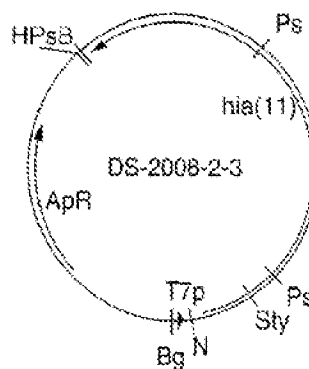
• **Yang, Yan-Ping**  
**Toronto**  
**Ontario M2R 3N7 (CA)**  
• **Klein, Michel**  
**Toronto**  
**Ontario M2P 1B9 (CA)**

(74) Representative: **Sahans, Sarah Anne**  
**HLBBshaw**  
**Merlin House**  
**Falconry Court**  
**Baker's Lane**  
**Epping, Essex CM16 5DQ (GB)**

(54) **Recombinant haemophilus influenzae adhesin proteins**

(57) Recombinant production of Hia protein, in full-length and N-terminally truncated forms, of non-typeable strains of *Haemophilus influenzae*, is described. The nucleic acid and deduced amino acid sequences of Hia genes of various strains of non-typeable and type c *Haemophilus influenzae* also are described.

Restriction map of DS-2008-2-3, pT7 hia (11).



pT7 hia (11)

**FIG.1A**

**EP 2 133 359 A3**

FIG. 1B

Oligonucleotides used to PCR amplify the full-length strain 11 *hlsA* gene for expression studies.

5515

EcoRI NseI  
 ↓ ↓  
 M N K I F N V I W N F  
 5' GCGAATTCATATGACAAATTTTAACTTTTTCGGAT 3' 5038.SL  
 SEQ ID NO:2  
 SEQ ID NO:1

quiltse

K T G V A A G V G Y Q W \* \* SEQ ID NO:5  
 5' AAACGCGCCCTTCAGCGAGTCTTGTTTACCGTGGTAATAG 3' SEQ ID NO:4  
 3' TTTTGTCCCAACATKCHLACACCAACAGGGTCAACCATTTTCTTAAGGCTTGGG 5' 5039..SL SEQ ID NO:3  
 ↑ ↑  
 EcoR I BamH I



## EUROPEAN SEARCH REPORT

Application Number

EP 09 17 0138

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 96/30519 A1 (UNIV WASHINGTON [US]; UNIV ST LOUIS [US]; ST GENE JOSEPH W III [US]; B) 3 October 1996 (1996-10-03) * page 43, line 3 - page 44, line 4; sequence 2 *	1-17	INV. C07K14/285 A61K39/102
A	GENE J W S ET AL: "CHARACTERIZATION OF THE GENETIC LOCUS ENCODING HAEMOPHILUS INFLUENZAE TYPE B SURFACE FIBRILS" JOURNAL OF BACTERIOLOGY, WASHINGTON, DC, US, vol. 178, no. 21, November 1996 (1996-11), pages 6281-6287, XP000863110 ISSN: 0021-9193 * the whole document * * figure 6 *	1-17	ADD. C12N15/70 C12N15/09
A	YANG Y P ET AL: "A 20-kilodalton N-terminal fragment of the D15 protein contains a protective epitope(s) against Haemophilus influenzae type a and type b." INFECTION AND IMMUNITY JUL 1998, vol. 66, no. 7, July 1998 (1998-07), pages 3349-3354, XP002467368 ISSN: 0019-9567 * page 3349, right-hand column; figure 1 * * page 3351 *	1-17	TECHNICAL FIELDS SEARCHED (IPC) C07K C12N
A	BERNARDEZ CLARK DE E: "Refolding of recombinant proteins" CURRENT OPINION IN BIOTECHNOLOGY, LONDON, GB, vol. 9, no. 2, 1 April 1998 (1998-04-01), pages 157-163, XP002275588 ISSN: 0958-1669 * page 157, last paragraph *	1-17	
-/-			
The present search report has been drawn up for all claims			
Place of search:		Date of completion of the search	Searcher
Munich		1 February 2010	Griesinger, Irina
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document I: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document			



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 09 17 0138

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	WO 00/51633 A (CONNAUGHT LAB [CA]; LOOSMORE SHEENA M [CA]; YANG YAN PING [CA]; KLEIN) 8 September 2000 (2000-09-08) * example 3 * -----	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search:		Date of completion of the search	Examiner
Munich		1 February 2010	Griesinger, Irina
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 3  
 EPO FORM 1503 (01.09.04)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 17 0138

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-02-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9630519	A1	03-10-1996	AT 285474 T	15-01-2005
			AU 718392 B2	13-04-2000
			AU 5322896 A	16-10-1996
			CA 2216292 A1	03-10-1996
			DE 69634077 B1	27-01-2005
			DE 69634077 T2	02-03-2006
			EP 0815236 A1	07-01-1998
			JP 4141496 B2	27-08-2008
			JP 11502713 T	09-03-1999
			US 5646259 A	08-07-1997
			US 6759213 B1	06-07-2004
			US 6060059 A	09-05-2000
			US 6200578 B1	13-03-2001
WO 0051633	A	08-09-2000	AU 769256 B2	22-01-2004
			AU 2790400 A	21-09-2000
			CA 2366316 A1	08-09-2000
			EP 1159001 A2	05-12-2001
			JP 2002538169 T	12-11-2002
			MX PA01008913 A	24-04-2002
			NZ 514413 A	27-02-2004
			US 6342232 B1	29-01-2002

EPC FORM 2159

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82